

AMENDMENTS TO THE CLAIMS:

Please amend claims 10, 20, 22-28 and 30 and cancel without prejudice claims 29, 48 and 49 as follows.

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (previously presented) A transmitter apparatus comprising:

one or more lasers,

modulation means for information modulating radiation output by each of said one or more lasers,

output means for outputting the modulated radiation produced by the modulation means; and

hollow core optical waveguides formed in a substrate for guiding radiation from the one or more lasers to the modulation means and from the modulation means to the output means, wherein said substrate comprises a silicon on insulator (SOI) wafer.

2. (previously presented) An apparatus according to claim 1 wherein at least one of the one or more lasers and the modulation means is a discrete component.

3. (original) An apparatus according to claim 2 wherein said discrete component is located in an alignment slot formed in the substrate.

4. (original) An apparatus according to claim 1 wherein at least one of the one or more lasers and the modulation means is a monolithic component formed in the substrate.

5. (previously presented) An apparatus according to claim 1 wherein the output means is arranged to couple the modulated radiation into at least one output optical fibre.

6. (original) An apparatus according to claim 5 wherein the output means comprises at least one fibre attachment means.

7. (original) An apparatus according to claim 6 wherein at least one optical fibre attachment means is arranged to receive a lensed output optical fibre.

8. (original) An apparatus according to claims 6 wherein at least one optical fibre attachment means comprises a mode matching means.

9. (previously presented) An apparatus according to claim 1 comprising one laser.

10. (currently amended) A transmitter apparatus comprising:
a plurality of lasers,
modulation means for information modulating radiation output by each of said plurality of lasers,
output means for outputting the modulated radiation produced by the modulation means;
and

hollow core optical waveguides formed in a substrate for guiding radiation from the plurality of lasers to the modulation means and from the modulation means to the output means, wherein said substrate comprises a silicon on insulator (SOI) wafer.

11. (original) An apparatus according to claim 10 wherein each of said plurality of lasers have a different output wavelength.

12. (original) An apparatus according to claim 11 wherein beam combining means are additionally provided to combine the plurality of modulated beams into a combined beam wherein said output means is arranged to couple the combined beam into a single output optical fibre.

13. (previously presented) An apparatus according to claim 10 wherein said output means is arranged to couple each of said plurality of modulated beams into one of a plurality of output optical fibres.

14. (previously presented) An apparatus according to claim 1 wherein one or more lasers is a semiconductor laser.

15. (original) An apparatus according to claim 14 wherein said semiconductor laser is a wavelength tuneable semiconductor laser.

16. (previously presented) An apparatus according to claim 1 wherein one or more detectors are provided to monitor the intensity of radiation output by said one or more lasers.

17. (previously presented) An apparatus according to claim 1 and further comprising at least one optical isolator.

18. (previously presented) An apparatus according to claim 1 wherein one or more beam shaping means are provided.

19. (original) An apparatus according to claim 18 wherein at least one of said beam shaping means comprise one or more lenses.

20. (currently amended) A transmitter apparatus comprising:
one or more lasers,
modulation means for information modulating radiation output by each of said one or more lasers,
output means for outputting the modulated radiation produced by the modulation means;
hollow core optical waveguides formed in a substrate for guiding radiation from the one or more lasers to the modulation means and from the modulation means to the output means; and
one or more beam shaping means are provided, wherein at least one of said beam shaping means comprises a tapered hollow core optical waveguide, wherein said substrate comprises a silicon on insulator (SOI) wafer.

21. (previously presented) An apparatus according to claim 1 wherein said modulation means comprises one or more electro-optic modulators.

22. (currently amended) A transmitter apparatus comprising:

at least one laser for producing information modulated radiation;

output means for coupling the radiation produced by the laser into at least one output optical fibre; and

hollow core optical waveguides formed in a substrate for guiding radiation from the at least one laser to the at least one output optical fibre, wherein said modulation means comprises one or more electro-optic modulators, wherein said substrate comprises a silicon on insulator (SOI) wafer.

23. (currently amended) An information modulated radiation receiver apparatus comprising:

at least one hollow core optical waveguide formed in a substrate;

one or more detectors; and

one or more optical fibre attachment means, the one or more optical fibre attachment means adapted to receive one or more optical fibres, wherein said radiation is guided from the one or more optical fibres to the one or more detectors by said at least one hollow core optical waveguide, said at least one hollow core waveguide guiding said radiation in two transverse directions, wherein said substrate comprises a silicon on insulator (SOI) wafer and further comprising at least one variable optical attenuator arranged to provide controllable attenuation of the radiation received from said at least one optical fibre.

24. (currently amended) An apparatus according to claim 23 wherein said receiver apparatus comprises comprising a plurality of detectors.

25. (currently amended) An apparatus according to claim 24 wherein said receiver apparatus includes a plurality of optical fibre attachment means ~~are provided to receive for receiving~~ a plurality of optical fibres.

26. (currently amended) An apparatus according to claim 25 wherein, ~~in use~~, said receiver apparatus receives radiation from each of said plurality of optical fibres which is guided to one of the plurality of detectors.

27. (currently amended) An apparatus according to claims 24 wherein in said receiver apparatus one optical fibre attachment means is provided, said optical fibre attachment means ~~being~~ is arranged to receive one optical fibre carrying radiation comprising a plurality of different wavelength channels.

28. (currently amended) An apparatus according to claim 27, said receiver apparatus ~~and~~ further comprising wavelength demultiplexing means, said wavelength demultiplexing means ~~being~~ is arranged to separate said different wavelength channels and to direct each wavelength channel to one of the plurality of detectors.

29. (cancelled).

30. (currently amended) An apparatus according to claim 23 and said receiver apparatus further comprising at least one wavelength selective filter.

31. (previously presented) An apparatus according to claim 23 wherein at least one optical fibre attachment means comprises a mode matching means.

32. (previously presented) An apparatus according to claim 23 wherein at least one optical fibre attachment means is arranged to receive a lensed optical fibre.

33. (previously presented) An transmit/receive apparatus comprising transmitter apparatus as claimed in claim 1 and receiver apparatus.

34. (original) Apparatus according to claim 33 wherein said transmitter apparatus and said receiver apparatus are formed on a common substrate.

35. (previously presented) An apparatus according to claim 1 wherein the substrate comprises semiconductor material.

36. (cancelled).

37. (previously presented) An apparatus according to claim 1 formed by micro-fabrication techniques.

38. (original) An apparatus according to claim 37 wherein the micro-fabrication technique includes deep reactive ion etching.

39. (previously presented) An apparatus according to claim 1 wherein the hollow core optical waveguides are of substantially rectangular cross section.

40. (previously presented) An apparatus according to claim 1 wherein the hollow core optical waveguides are dimensioned to preferably guide radiation propagating in the fundamental mode.

41. (previously presented) An apparatus according to claim 1 wherein the hollow core optical waveguides are dimensioned to preferably guide radiation propagating in multiple optical modes.

42. (previously presented) An apparatus according to claim 1 wherein the internal surfaces of the hollow core optical waveguides carry a reflective coating.

43. (previously presented) An apparatus according to claim 1 wherein the substrate comprises a base portion and a lid portion.

44. (cancelled)

45. (cancelled)

46. (cancelled)

47. (currently amended) A transmitter apparatus comprising:

one or more lasers,

at least one electro-optic modulator for information modulating radiation output by each of said one or more lasers,

a transmitter for outputting the modulated radiation produced by the modulator; and

hollow core optical waveguides formed in a substrate for guiding radiation from the one

or more lasers to the modulator and from the modulator to the transmitter, wherein said substrate comprises a silicon on insulator (SOI) wafer.

48. (cancelled).

49. (cancelled).